

According to still further aspects of the invention, the manager provides one or more management functions including, by way of non-limiting example, interfacing with a SAN administrator, resolving SAN topology, managing storage device logical unit number assignment, and managing extension of host file systems. The agents can serve as proxies (or 5 agents) for the manager, effecting functionality on its behalf at the host level. This functionality can include SAN component attribute collection, LUN masking control, host file system monitoring, and file system extension implementation.

Further aspects of the invention provide systems as describe above in which one or more agents 10 utilize their associated hosts to query and otherwise gather information regarding storage devices to them (the hosts) via the interconnect. This information can include the number of logical units present on each physical storage device, the identification of the physical storage device and its respective logical units, and/or the storage capacity of each logical unit. Queries from the hosts to the devices can be effected via using the protocol of the interconnect, e.g., a SCSI protocol for 15 a fiber channel interconnect.

In related aspects of the invention, the manager correlates information collected by the agents from their respective hosts, e.g., disambiguating identifies of logical units in the storage devices and, more typically, on the SAN, from potentially only partial (or incomplete) information 20 supplied by each agent. In accord with policies established by the SAN administrator (and entered into the manager, e.g., via its graphical interface), the manager assigns logical units to the hosts. According to related aspects of the invention, the manager communicates those assignments to, and effects them via, the agents.

Further related aspects of the invention provide SAN systems as described above in which each agent imposes logical unit number (LUN) assignments on their respective agents, e.g., via filters at the adapter layer. This facilitates communication between the host and its assigned storage devices by obviating the need for it (the host) to consult the manager for each read/write operation to those or other (e.g., unassigned) storage devices.

In still further aspects, the invention provides SANs as described above in which the manager includes a graphical user interface (GUI) for display of SAN topology and/or for input of administrator-defined SAN "policy," by way of non-limiting example, LUN assignment, unassignment, and file extension policy. The GUI can provide a plurality of views, each for example with icons or text representations (collectively, "icons" or "graphical objects") representing hosts, storage devices (or logical units), associations therebetween (e.g., assignment or accessibility), and/or properties thereof.

15

Assignment of a LUN to a host is permitted through administrator/operator-selection of a host icon and a LUN icon on the GUI display. This is beneficially facilitated, according to one aspect of the invention, by selectively activating the icons representing the LUNs only after the icon for a specific host has been selected and, then, only activating icons for those LUN that are accessible to the selected host and otherwise suitable for assignment.

20

In related aspects of the invention, the GUI provides icons representing SAN operations, such as assignment, unassignment, and so forth. These icons are beneficially activated, for example,

only when icons for corresponding hosts, storage units and/or other SAN components have been selected. For example, an icon for executing a LUN-to-host assignment operation is activated only after both a host and a LUN are selected. This can likewise be true of a LUN-to-host unassignment operation. A GUI with such features advantageously facilitates administrator 5 action, minimizing the number input decisions on the part of an administrator as well as the number of key strokes, "mouse" clicks, or other operator input device operations.

In further related aspects of the invention, a topological, hierarchical or enumerated (i.e., listing) display of SAN components can be accompanied by a display of component properties (e.g., 10 identity of LUNs in a physical storage device, and so forth). The latter display, too, is beneficially generated only upon selection of a specific component in the former display. In a related aspect, data necessary for generating the latter (i.e., a component property) display is retrieved, for example, from a local or remote database, only upon selection of a specific component in the former display.

15

Further related aspects of the invention provide a system as described above in which the GUI provides for selective display of storage devices, or logical units, depending upon their storage capacity or other quantitative attributes. In this regard, the GUI permits operator/administrator specification of a numerical range for use by the manager in filtering storage device display.

20 This aspect of the invention can be used to display, for example, logical units having a storage capacity, say, of between four and six gigabytes or, for example, greater than ten gigabytes.